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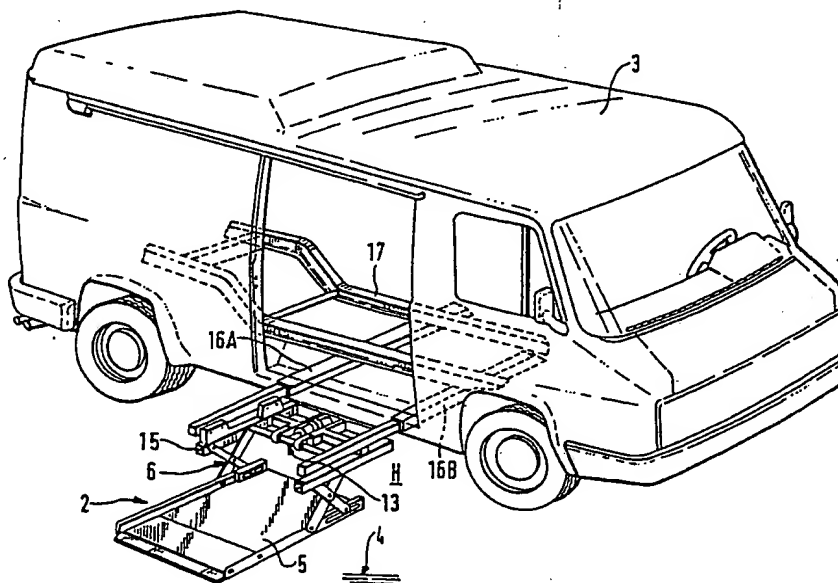
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/SE87/00523 (22) International Filing Date: 9 November 1987 (09.11.87) (31) Priority Application Number: 8604797-4 (32) Priority Date: 10 November 1986 (10.11.86) (33) Priority Country: SE (71)(72) Applicant and Inventor: SVENSSON, Ingemar [SE/SE]; Bentzels väg 22, S-443 00 Lerum (SE). (74) Agent: LINDBERG, Bo; Cederbom & Lindberg AB, Box 53252, S-400 16 Göteborg (SE). (81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BG, BR, CH, CH (European patent), DE, DE (Utility model), DE (European patent), DK, FI, FR (European patent), GB, GB (European patent),</p>		<p>HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SU, US.</p> <p>Published <i>With international search report.</i> <i>With amended claims.</i> <i>In English translation (filed in Swedish).</i></p>

(54) Title: **ARRANGEMENT FOR A LIFT ADAPTED TO A MOTOR VEHICLE**



(57) Abstract

Arrangement for a lift (2) adapted to a motor vehicle, which lift comprises a lifting platform (5) capable of moving between the vehicle (3) and a floor (4). The invention makes it possible, amongst other things, to apply simple means in order to achieve a reliably and efficiently functioning lift arrangement, for example for individuals in wheelchairs who wish to move between a vehicle and the outside of the vehicle without having to have an assistant to carry them, or without needing to make use of other, small and effective ramp or lift arrangements. The platform (5) is attached via a scissor mechanism (6) to a source of power (13) for the platform, so that the platform, upon actuation of said source of power, will move between a lower and an upper end position, one of which at least is situated at a different level to that of the attachment of the scissor mechanism to the source of power.

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Arrangement for a lift adapted to a motor vehicle

The present invention relates to an arrangement for a lift adapted to a motor vehicle, which lift comprises a lifting platform capable of moving between the vehicle and a floor.

5 The principal object of the present invention is to make available an arrangement of the kind indicated above which is simple, compact, reliable and durable and is easy to operate.

Said object is achieved by means of an arrangement in accordance with the present invention, which is characterized
10 essentially in that the platform is attached via a scissor mechanism to a source of power for the platform, so that the platform, upon actuation of said source of power, will move between a lower and an upper end position, one of which at least is situated at a different level to that of the attachment of the
15 scissor mechanism to the source of power.

The invention is described below in terms of a preferred illustrative embodiment, in conjunction with which reference is made to the accompanying drawings, in which:

Fig. 1 illustrates the invention mounted on a
20 vehicle;

Fig. 2 illustrates a section through the lift arrangement in a withdrawn storage position beneath the vehicle;

Fig. 3 illustrates the lift arrangement extended to a lifting position next to the vehicle;

25 Fig. 4 illustrates a perspective view of the lift arrangement alone, with its platform displaced to an intermediate position;

Fig. 5 illustrates the lift arrangement with its platform in the lowered position;

30 Fig. 6 illustrates the lift arrangement with its platform in the raised position and viewed from above;

Fig. 7 illustrates the lift arrangement viewed from below;

Fig. 8 illustrates a part of a scissor mechanism
35 forming part of the lift arrangement;

Fig. 9 illustrates an edge stop mechanism situated on the platform, in a hinged stop position;

Fig. 10 illustrates said mechanism folded down in the unactuated position.

An arrangement 1 for a passenger lift 2 executed in accordance with the present invention, which lift is adapted to a motor vehicle and comprises a lift platform 5 capable of moving between the vehicle 3 and a floor 4, includes a scissor mechanism 6. The platform 5 is connected via said scissor mechanism 6, which can include a supporting link 9, 10 and a guide link 11, 12 situated on the two lateral edges 7, 8 of the platform, to a suitable source of power 13, which enables the platform 5 to be actuated in order to achieve the desired raising of same. It is possible in this way, by actuating said source of power 13, to cause the platform 5 to be displaced between a lower end position I and an upper end position II, as illustrated in Fig. 5 and Fig. 6, for example. At least one of said end positions I, II is situated at a different level A and B to the level C at which the connection 14 between the scissor mechanism 6 and the source of power 13 is situated.

The platform 5 is conveniently so arranged as to be capable of moving between a level A and a level B respectively situated below and above said drive connection 14 and the level C for same, as illustrated in the drawings.

The attitude of said platform 5 is essentially horizontal during the period for which it is being caused to move between said end positions I and II, provided, of course, that the vehicle 3 is standing on a level floor 4, thanks to the presence of said scissor mechanism 6.

The platform 5, which in the embodiment illustrated is in the form of a flat sheet, but which may naturally exhibit some other desired form, including a form resembling a chair seat or some other support for a seated individual, is appropriately supported by a frame 15, which in turn may be supported by a guide arrangement 16 situated, for example, on the underside 3A of a vehicle, which guide arrangement may consist of two guide channels 16A, 16B, for example, attached to the chassis frame 17 of the vehicle, along which channels the lifting frame 15 is supported in

such a way as to be capable of being freely guided, conveniently in a telescopic fashion, between a storage position L in which it is withdrawn into a position close to the vehicle 3, as illustrated in Fig. 2, for example, and an extended lifting position H in which it is extended, for example, laterally away from the vehicle and to the outside of same, as illustrated in Fig. 1 and Fig. 3, for example.

The frame 15 can exhibit a peripheral form of 'C'-section and can be constructed from channel-shaped lateral members 18, 19 with transverse members 20, 21, 22 attached to it at one of its free ends 18A, 19A.

A hydraulic cylinder arrangement 13 or some other appropriate jack 13 powered by fluid or actuated mechanically can be supported, for example, in such a way that it is free to pivot in the vicinity of said transverse members 20, 21, 22. For example, a piston cylinder 13A can be supported by a bearing 23 which encloses the piston cylinder 13A, and which, via projecting bearing shafts 24, which are supported by bracing struts 25, 26 attached to said transverse members 20-22, are supported in such a way that they are free to pivot in the direction of the arrows 27, 28. A piston rod 13B which is capable of being caused to extend from the piston cylinder 13A, is attached via an articulated joint 29 to a shaft 30 forming part of said source of power 13, which shaft is supported by the bracing struts 25, 26 in such a way that it is free to pivot in the direction of the arrows 31, 32. Said pivot shaft 30 is rigidly connected to the free ends 9A and 10A of said scissor mechanisms 6 situated to either side of the frame 15 and the platform 5.

Actuation of the jack 13 will cause the shaft 30 to rotate in either direction 31, 32, and will cause the supporting links 9, 10 to pivot about the shaft 30 in the direction of the arrows 33, 34.

The other end 9B, 10B of the supporting links 9, 10 is pivotally attached to the two lateral edges 7, 8 of the platform via a swivelling connection 35, and said ends 9A, 10A and 9B, 10B are so arranged as to be maintained at the same level as the platform 5 and as the frame 15.

Said guide links 11, 12, which are attached to their corresponding supporting links 9, 10 via an appropriate link 36 at the point of intersection between said links 9, 11 and 10, 12, so that they can pivot in relation to one another, appropriately extend in a zig-zag fashion along the corresponding supporting link 9, 10 in a plane 37, 38 situated to either side of said supporting link 9, 10. The possibility is afforded in this way for the simple and effective connection of the end surfaces 7, 8, etc., of the platform to the frame 15.

The guide links 11, 12 are freely guided by guides 39, 40 extending along said frame 15 and end surfaces 7, 8 via guide arrangements 39A, 40A interacting with same for the purpose of maintaining the platform 5 in the desired attitude during raising of same and whilst it is being held stationary in the supporting position III and in the loading position I, II. Said guides 39, 40 can take the form of internal cavities in the lateral members 18, 19 of the frame with corresponding end walls 41, and of an elongated slot in the end walls 7, 8.

In order to prevent wheelchairs or other mobile carriages or similar objects which it is proposed to raise by means of the lift 2 from passing unintentionally beyond the front edge 5A of the platform, an edge guard 100 can be used, conveniently of the kind illustrated in detail in the drawings in Fig. 9 and Fig. 10. said edge guard 100 can comprise a mechanism which is actuated automatically when the lift 2 is operated. A stop 103, for example a plate, pivotally supported about a pivot shaft 102, is so arranged when in the raised position, as illustrated by way of example in Fig. 9, as to constitute an effective arrester device and to prevent wheelchairs, etc., from rolling from a ramp 104 adjacent to the platform 5. The ramp 104, which in turn is freely supported at its end 104A facing towards the platform 5, is supported, for example, in such a way as to pivot about a shaft 105 extending between the end surfaces 7, 8. The ramp 104 is also so arranged at its end 104B facing away from the platform 5 in such a way as to be capable of interacting with a holder 106. The holder 106 can take the form of an upright 107, for example a bolt,

situated to either side of the platform 5 and attached to its end surfaces 7, 8, which upright is freely accommodated at its upper end 107A in a hole in a support bracket 108, which bracket is supported on each end surface 7, 8. A number of nuts 110
5 interacting with threads 109 on the upright 107 are so arranged as to function as adjustable end stops for the upright 107. The bottom ends 107B of the uprights 107 are so arranged as to be accommodated in holes in the ramp 104, and as to be connected to a suitable mounting 111, for example a strip extending between the uprights
10 107.

The function of said edge guard 100 can be as follows: in the raised position, as illustrated in Fig. 9, the uprights 107 are maintained at a distance from the floor 4 such that the ramp 104 rests on said mounting 111 connected to the
15 uprights 107, and is also capable in said position of accepting a load on the upper side 104C of the ramp. The end edge 112 or some other part of the ramp 104 interacts in said raised stop position III with the inner edge 113 or some other part of the stop 103, so that this is positively maintained in an upward-hinged position,
20 and the ramp 104 is maintained in a slightly downward-hinged attitude at a certain distance X from the attachment 108. If the platform 5 is lowered to the floor 4, the uprights 107 will be displaced successively, as illustrated in Fig. 10, in relation to the attachment 108 and will be raised when the mounting 111 with
25 the ramp 104 makes contact with the floor 4. In conjunction with this the ramp 104 will be caused to pivot about the bearing shaft 105, and the interaction with the end 113 of the stop will cease increasingly as the platform 5 is lowered, and will finally cease entirely when the stop 103 is lying, for example, flat along the
30 ground 4 and forms a continuation of the ramp 104, permitting comfortable passage in this loading position I between the floor 4 and the platform 5 via the stop 103 and the ramp 104. The uprights 107 will thus have been raised so that the distance Y between the ramp 104 and the attachment 108 will have reduced.

35 Raising of the platform 5 will mean that the ramp 104 will cause the stop to be raised in the direction of the arrow

114, before being lowered again in the direction of the arrow 115 upon lowering the platform 5.

The function of the Lift arrangement 1 described above should have emerged from what is stated above, although the following brief comments may be made: the possibility is afforded in the extended position beyond the side of the vehicle, for example after displacement on rollers 42 which are supported by the frame 15, of raising the platform 5 into the desired position by actuating the driving jack 13 so that the shaft 30 is caused to rotate in the desired direction 31 and 32, depending on whether the jack 13 is caused to be shortened or lengthened. In conjunction with this the shaft 30 causes the supporting links 9, 10 to rotate in either direction 33 and 34 in order either to lower or to raise the lifting platform 5 towards said end positions I and II from its lifting position H. The possibility is thus afforded in a lower position I of driving a wheelchair or some other object onto the platform 5 directly from the floor 4, and of causing the wheelchair to advance as far as the internal space 38 of the vehicle once the platform with the wheelchair and the load supported on it have been raised to the correct level adjacent to the floor 3C of the vehicle, whilst maintaining the platform 5 in a horizontal attitude and after any necessary displacement of the platform 5 in the horizontal sense.

Manoeuvring of the arrangement can be effected in an appropriate fashion, for example by means of controls which are contained within the vehicle, although the possibility is also afforded for the remote control of the arrangement, for example via portable control devices which can be carried by the person riding in the wheelchair. Doors, too, can be connected to the remote control if such technology is used.

The invention is not restricted to the illustrative embodiment described above and illustrated in the drawings, but can be modified within the scope of the Patent Claims without departing from the idea of invention.

P a t e n t C l a i m s

1. Arrangement for a lift (2) adapted to a motor vehicle, which lift comprises a lifting platform (5) capable of moving between the vehicle (3) and a floor (4), characterized in that the platform (5) is attached via a scissor mechanism (6) to a source of power (13) for the platform (5), so that the platform, upon actuation of said source of power (13), will move between a lower and an upper end position (I and II), one of which at least is situated at a different level (A and B) to that of the attachment (14) of the scissor mechanism to the source of power (13).

2. Arrangement in accordance with Patent Claim 1, characterized in that the platform (5) is capable of movement whilst maintaining the platform in an essentially horizontal attitude between a level (A and B) situated respectively below and above said drive attachment (14).

3. Arrangement in accordance with Patent Claim 2, characterized in that the scissor mechanism (6) comprises a supporting link (9; 10) which, at its respective ends (9A, 10A and 9B, 10B), is attached to the platform (5) and to a frame (15), so that the ends of the link are kept on the same level as said platform (5) and frame (15).

4. Arrangement in accordance with Patent Claim 3, characterized in that the attachment between the source of power (13) and said scissor mechanism (6) comprises a pivotally supported shaft (30).

5. Arrangement in accordance with Patent Claim 4, characterized in that the pivotally supported drive shaft (30) is rigidly connected to an articulated end (9A, 10A), and is supported by a frame (15) and capable of being actuated by a jack (13).

6. Arrangement in accordance with any of the Patent Claims indicated above, characterized in that the scissor mechanism (6) comprises a guide link (11, 12) which is movably attached at its respective ends to said platform (5) and frame (15).

7. Arrangement in accordance with Patent Claim 6, characterized in that the guide links (11, 12) extend in a zig-zag fashion along a plane (37, 38) situated to either side of the supporting link (9, 10), with an articulated link (36) situated at the point of intersection between the supporting links and the guide links.

8. Arrangement in accordance with Patent Claim 7, characterized in that each end of said guide links (11, 12) is accommodated in a guide (39 and 40) extending in a horizontal plane along said platform (5) and frame (15).

9. Arrangement in accordance with any of the Patent Claims indicated above, characterized in that the platform (5) is supported by a frame (15) which is capable of moving between a withdrawn storage position (L) next to the vehicle and an extended lifting position (H) away from the vehicle (3).

10. Arrangement in accordance with Patent Claim 9, characterized in that the platform frame (15) is capable of being displaced telescopically between the underside (3A) of the vehicle and its outside.

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AMENDED CLAIMS

[received by the International Bureau on 24 March 1988 (24.03.88):
original claims 1-10 replaced by amended claims 1-7 (2 pages)]

1. Arrangement for a lift (2) adapted to a vehicle,
which lift comprises a lifting platform (5) capable of
moving between the vehicle (3) and a floor (4), and is
attached via a scissor mechanism (6) to a source of power
5 (13) for the platform (5), so that the platform, upon actua-
tion of said source of power (13), will move between a
lower and an upper end position (I and II), c h a r a c -
t e r i z e d in that the platform (5) is supported by
a frame (15) which is capable of moving between a withdrawn
10 storage position (L) next to the vehicle and an extended
lifting position (H) away from the vehicle (3); and is
capable of being displaced telescopically between the under-
side (3A) of the vehicle and its outside, the platform
(5) is moveable whilst maintaining it in an essentially
15 horizontal attitude between a level (A and B) situated
respectively below and above the drive attachment (14).
of the scissor mechanism (6) to the source of power (13)
and the said platform supporting frame (15).

2. Arrangement in accordance with Patent Claim 1,
20 c h a r a c t e r i z e d in that the scissor mechanism
(6) comprises a supporting link (9; 10) which, at its res-
pective ends (9A, 10A and 9B, 10B), is attached to the
platform (5) and to a frame (15), so that the ends of the
link are kept on the same level as said platform (5) and
25 frame (15).

3. Arrangement in accordance with Patent Claim 2,
c h a r a c t e r i z e d in that the attachment between
the source of power (13) and said scissor mechanism (6)
comprises a pivotally supported shaft (30).

30 4. Arrangement in accordance with Patent Claim 3,
c h a r a c t e r i z e d in that the pivotally supported
drive shaft (30) is rigidly connected to an articulated
end (9A, 10A), and is supported by a frame (15) and capable
of being actuated by a jack (13).

5. Arrangement in accordance with any of the Patent Claims indicated above, characterized in that the scissor mechanism (6) comprises a guide link (11, 12) which is movably attached at its respective ends to said platform (5) and frame (15).

6. Arrangement in accordance with Patent Claim 5, characterized in that the guide links (11, 12) extend in a zig-zag fashion along a plane (37, 38) situated to either side of the supporting link (9, 10), with an articulated link (36) situated at the point of intersection between the supporting links and the guide links.

7. Arrangement in accordance with Patent Claims 6, characterized in that each end of said guide links (11, 12) is accommodated in a guide (39 and 40) extending in a horizontal plane along said platform (5) and frame (15).

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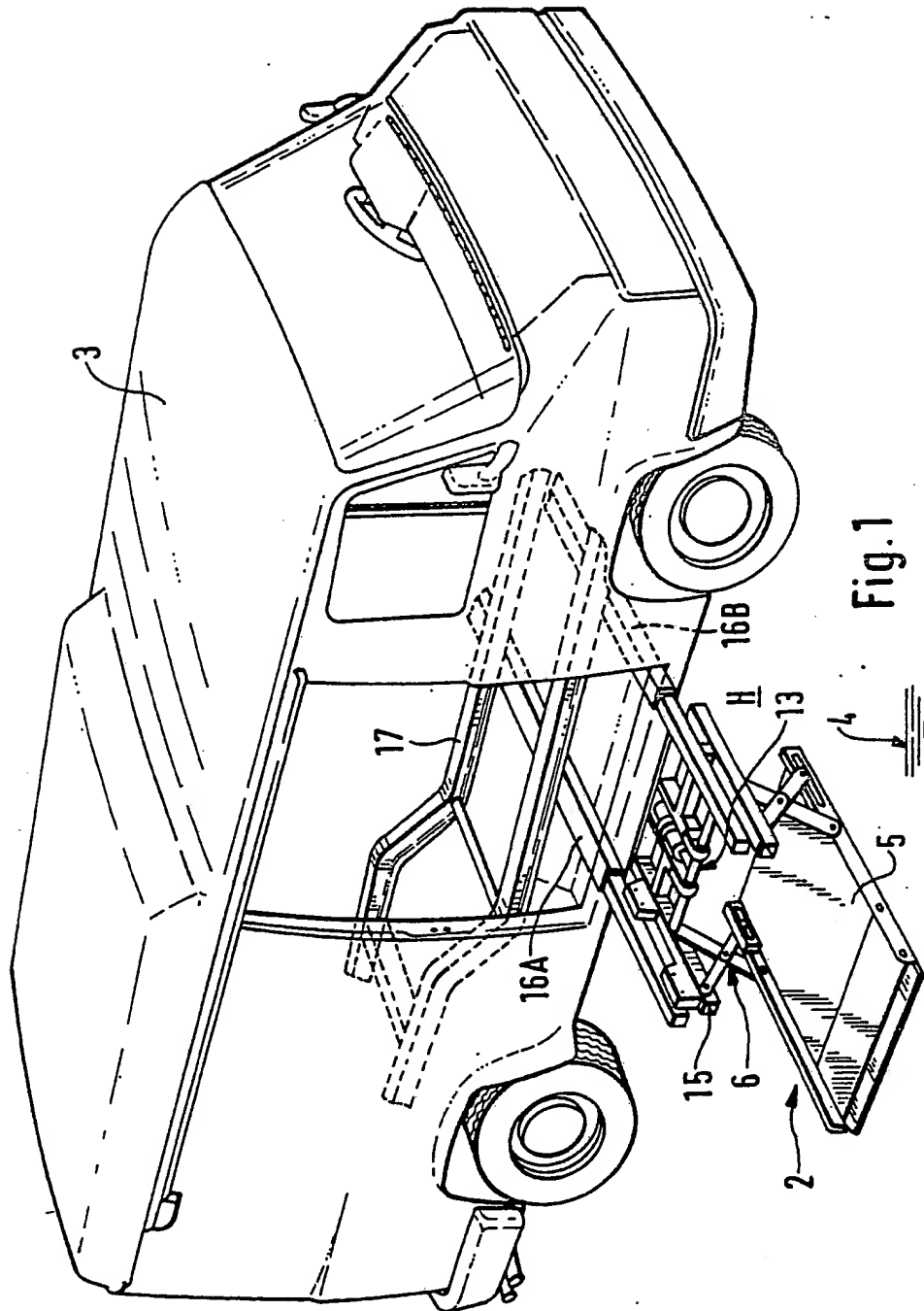


Fig. 1

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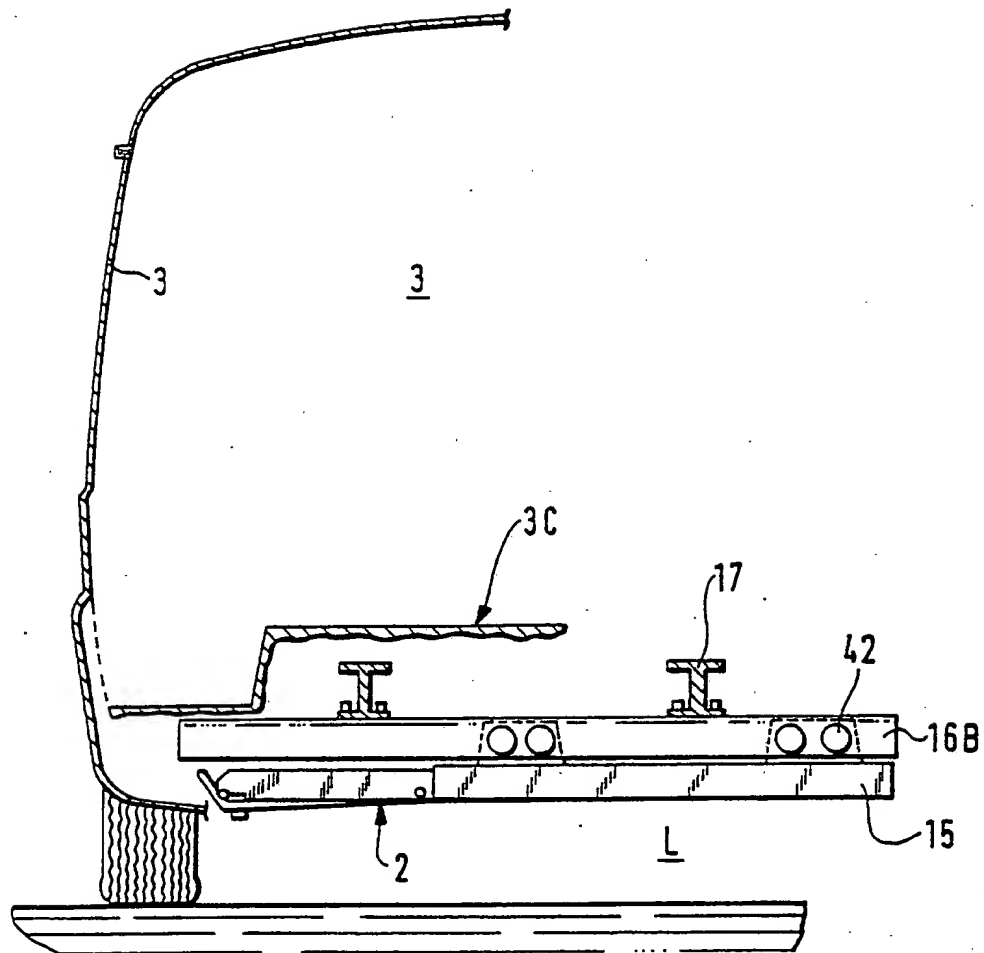
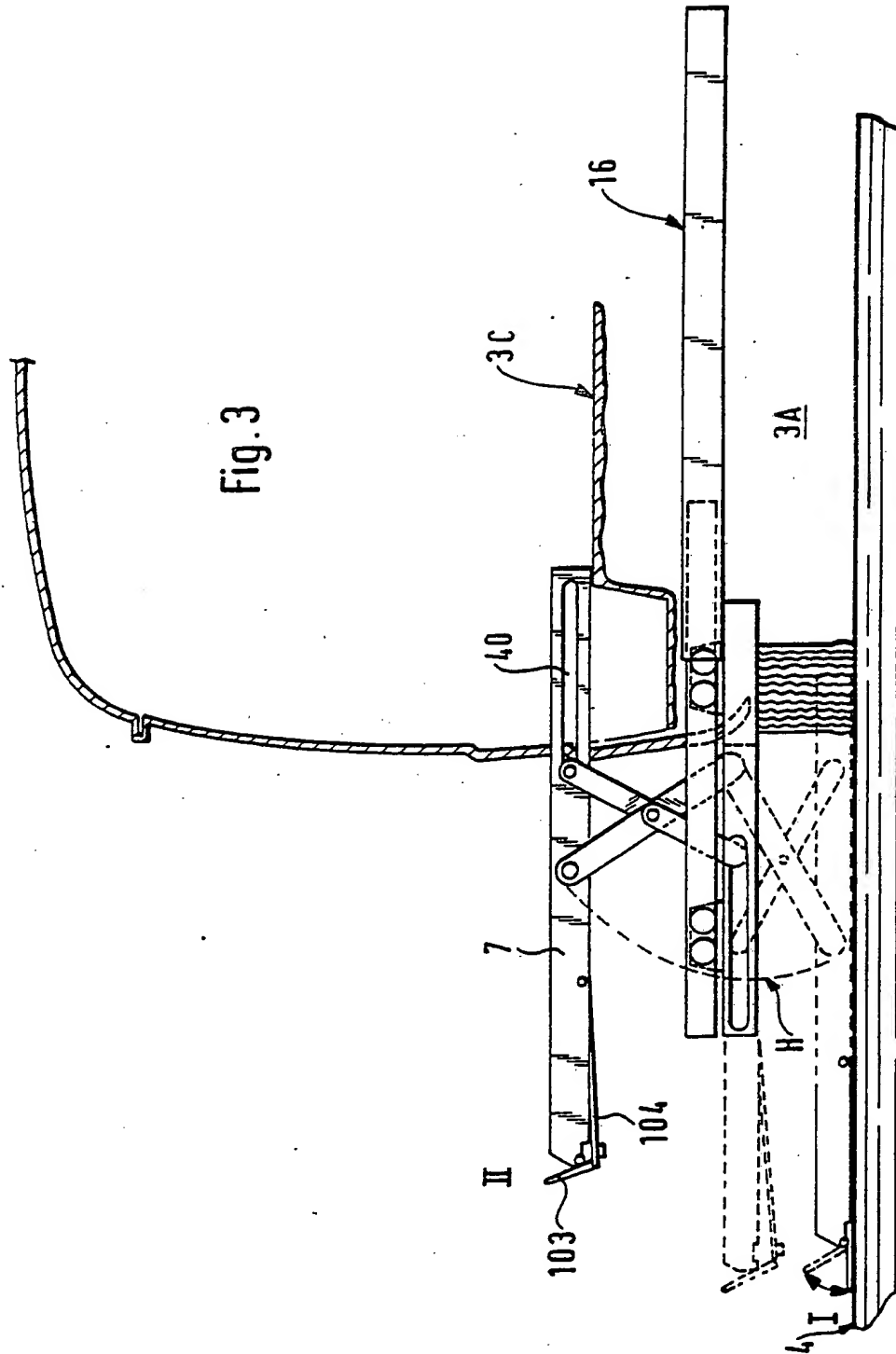


Fig. 2

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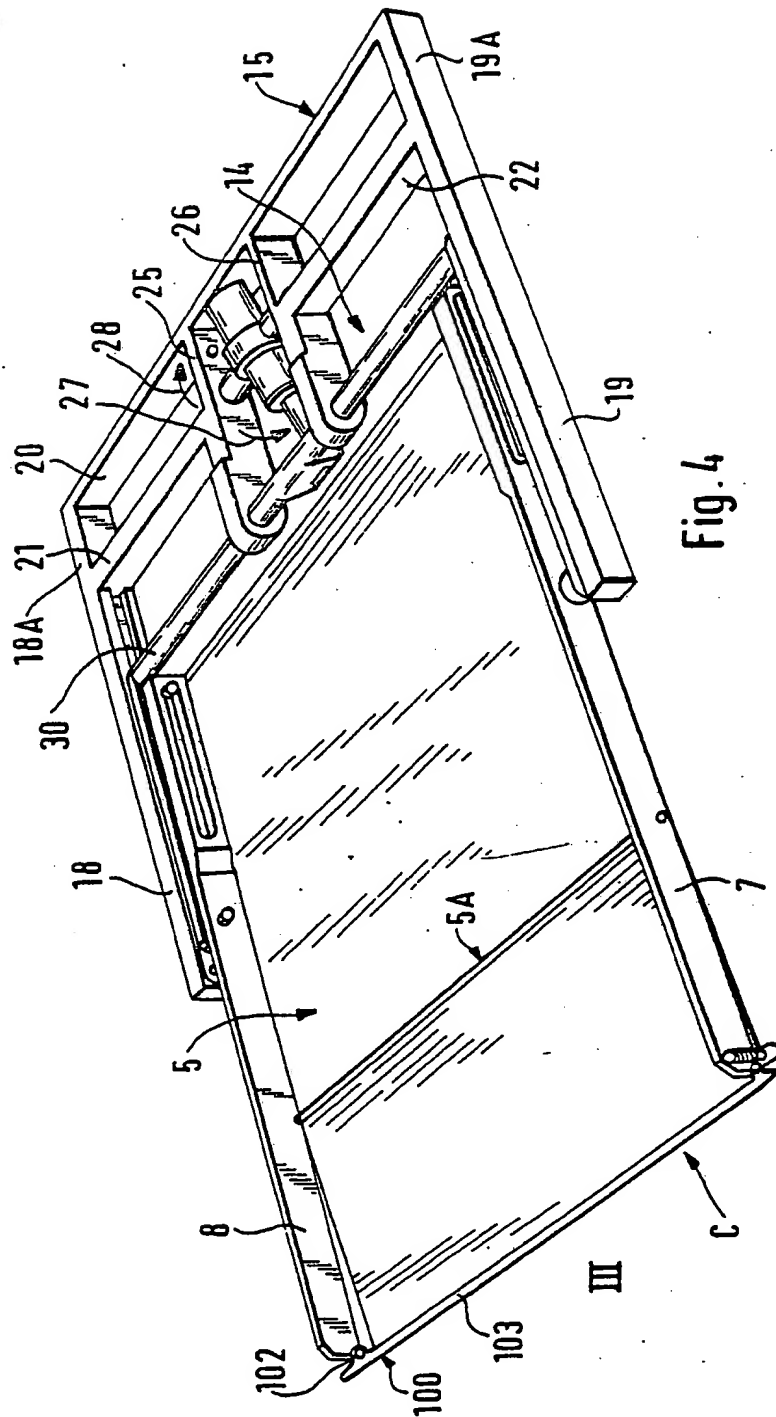
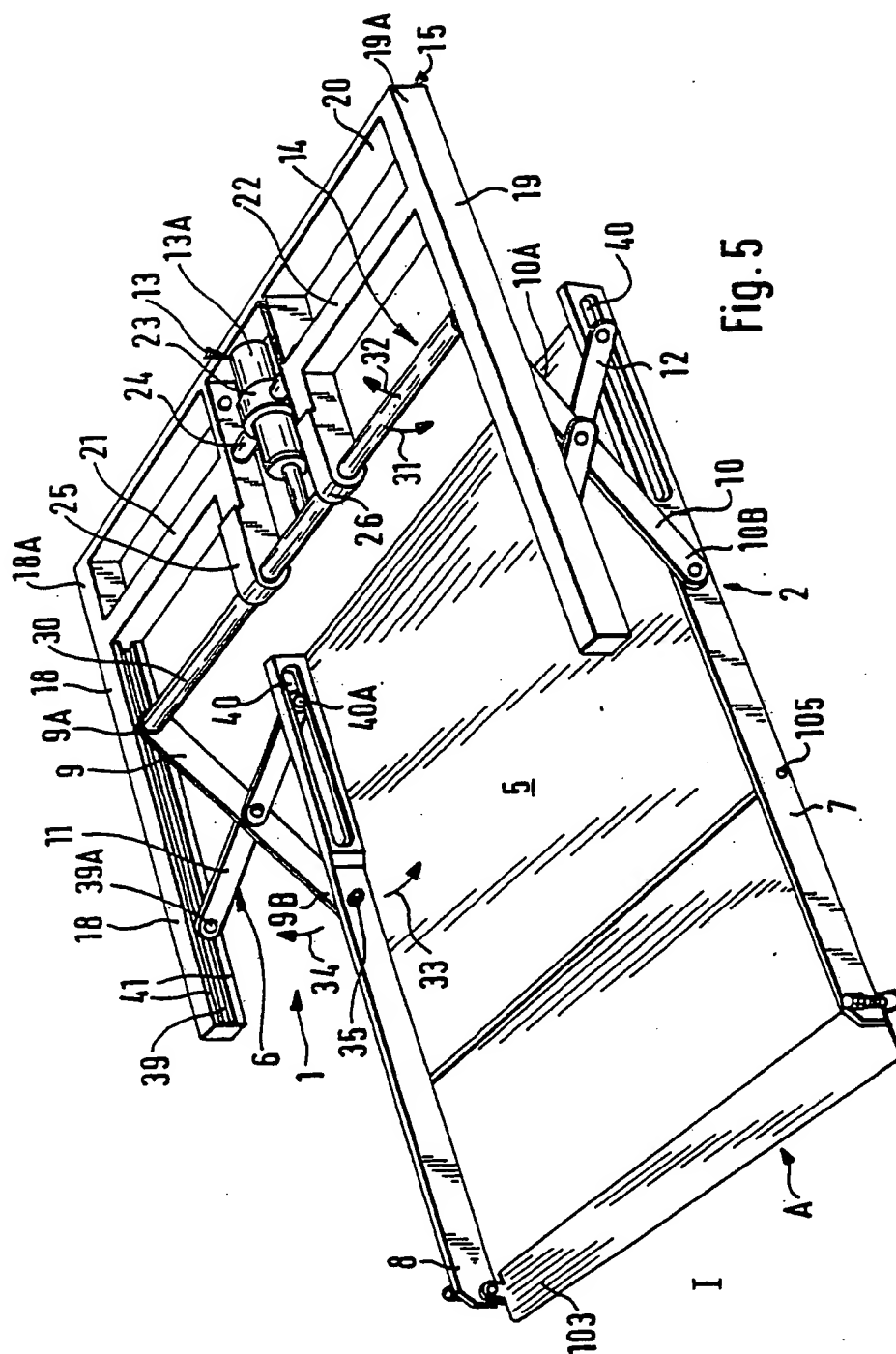


Fig. 4

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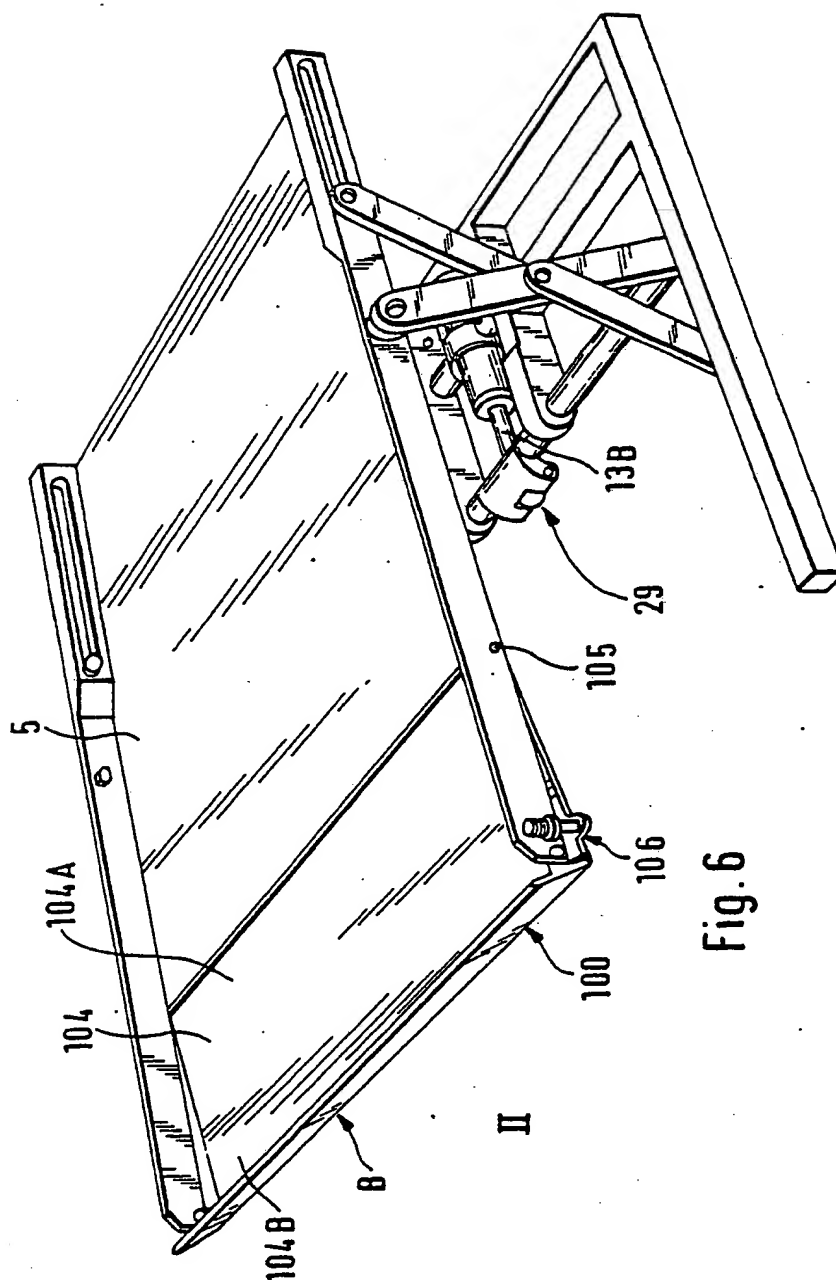
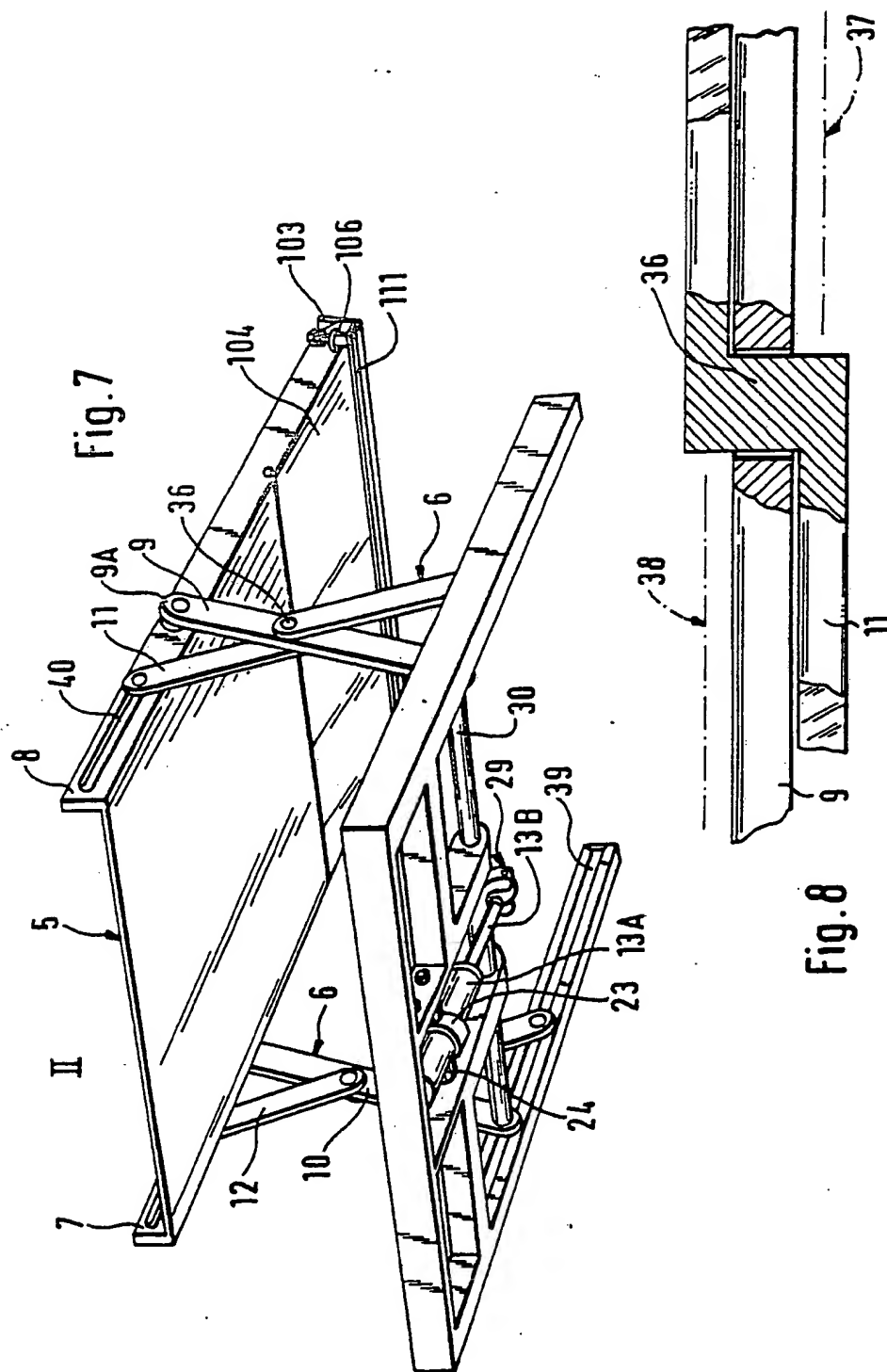
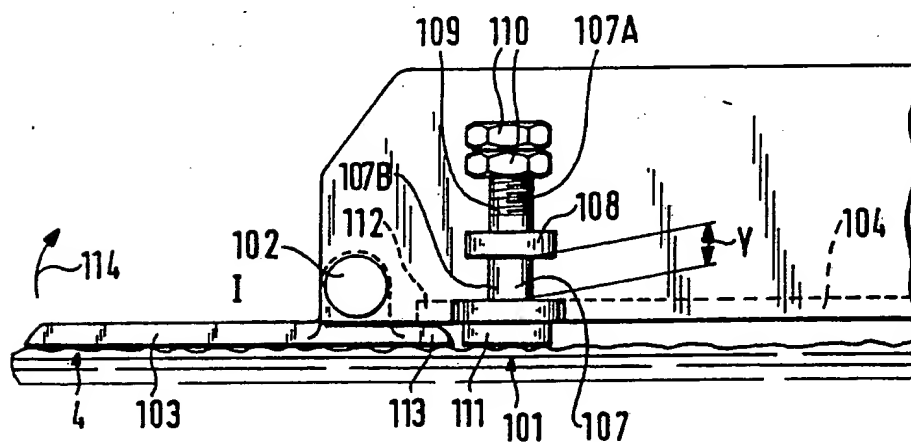
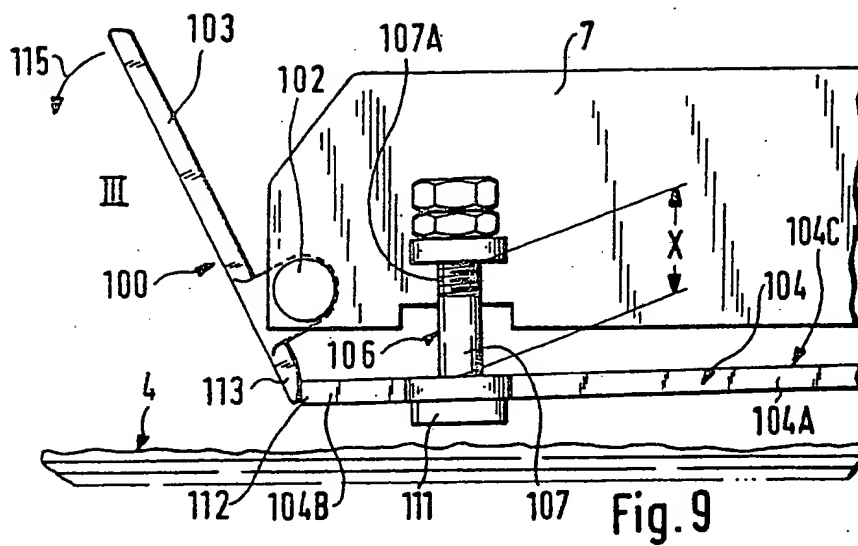


Fig. 6

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INTERNATIONAL SEARCH REPORT

International Application No PCT/SE87/00523

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) * According to International Patent Classification (IPC) or to both National Classification and IPC 4 <div style="text-align: center; padding: 5px;">B 60 P 1/44, A 61 G 5/00</div>														
II. FIELDS SEARCHED <div style="text-align: center; padding: 5px;">Minimum Documentation Searched 7</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%; padding: 5px;">Classification System</th> <th style="padding: 5px;">Classification Symbols</th> </tr> <tr> <td style="padding: 5px;">IPC 4</td> <td style="padding: 5px;">B 60 P 1/44, /46; A 47 C 19/04; A 61 G 5/00, /04; B 60 F 3/22</td> </tr> <tr> <td style="padding: 5px;">National Cl</td> <td style="padding: 5px;">35d: 6 .../...</td> </tr> </table> <div style="text-align: center; padding: 5px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched 8</div> <div style="text-align: center; padding: 5px;">SE, NO, DK, FI classes as above</div>			Classification System	Classification Symbols	IPC 4	B 60 P 1/44, /46; A 47 C 19/04; A 61 G 5/00, /04; B 60 F 3/22	National Cl	35d: 6 .../...						
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National Cl	35d: 6 .../...													
III. DOCUMENTS CONSIDERED TO BE RELEVANT 9 <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; padding: 5px;">Category *</th> <th style="padding: 5px;">Citation of Document, 11 with indication, where appropriate, of the relevant passages 12</th> <th style="width: 10%; padding: 5px;">Relevant to Claim No. 13</th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">US, A, 4 180 366 (ROTH ET AL) 25 December 1979 & BE, 869989 DE, 2759017 FR, 2411108 JP, 54083220 CA, 1085784 GB, 1594850 AU, 515228</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1,3,6,8</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="padding: 5px;">US, A, 4 058 228 (HALL) 15 November 1977 & CA, 1051390</td> <td style="text-align: center; vertical-align: top; padding: 5px;">2,9,10</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="padding: 5px;">Derwent's abstract D334 D/15, SU 751 792</td> <td style="text-align: center; vertical-align: top; padding: 5px;">4,5</td> </tr> </table>			Category *	Citation of Document, 11 with indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13	X	US, A, 4 180 366 (ROTH ET AL) 25 December 1979 & BE, 869989 DE, 2759017 FR, 2411108 JP, 54083220 CA, 1085784 GB, 1594850 AU, 515228	1,3,6,8	Y	US, A, 4 058 228 (HALL) 15 November 1977 & CA, 1051390	2,9,10	Y	Derwent's abstract D334 D/15, SU 751 792	4,5
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: 10</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>														
IV. CERTIFICATION <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> Date of the Actual Completion of the International Search <div style="text-align: center;">1988-01-18</div> </td> <td style="width: 50%; padding: 5px;"> Date of Mailing of this International Search Report <div style="text-align: center;">1988 -02- 0 1</div> </td> </tr> <tr> <td style="padding: 5px;"> International Searching Authority <div style="text-align: center;">Swedish Patent Office</div> </td> <td style="padding: 5px;"> Signature of Authorized Officer <div style="text-align: center;">Ake Carlsson <i>Ake Carlsson</i></div> </td> </tr> </table>			Date of the Actual Completion of the International Search <div style="text-align: center;">1988-01-18</div>	Date of Mailing of this International Search Report <div style="text-align: center;">1988 -02- 0 1</div>	International Searching Authority <div style="text-align: center;">Swedish Patent Office</div>	Signature of Authorized Officer <div style="text-align: center;">Ake Carlsson <i>Ake Carlsson</i></div>								
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FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET.

II

Fields Searched (cont)

US Cl 214: 75-80;
 414: 539-559

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim numbers because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claim numbers because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ²

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:
3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:
4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.